

What is claimed is:

1. An isolated polynucleotide comprising a nucleotide sequence selected from the group consisting of:

(a) the nucleotide sequence of SEQ ID NO:1 from nucleotide 256 to nucleotide 1404;

(b) the nucleotide sequence of SEQ ID NO:3 from nucleotide 103 to nucleotide 1242;

(c) a nucleotide sequence varying from the sequence of the nucleotide sequence specified in (a) or (b) as a result of degeneracy of the genetic code;

(d) a nucleotide sequence capable of hybridizing under stringent conditions to the nucleotide specified in (a) or (b);

(e) a nucleotide sequence encoding a species homologue of the sequence specified in (a) or (b); and

(f) an allelic variant of the nucleotide sequence specified in (a) or (b).

2. The polynucleotide of claim 1 wherein said nucleotide sequence encodes for a protein having a biological activity of the IL-13R binding chain.

3. The polynucleotide of claim 1 wherein said nucleotide sequence is operably linked to an expression control sequence.

4. The polynucleotide of claim 1 comprising the nucleotide sequence of SEQ ID NO:1 from nucleotide 319 to nucleotide 1257.

5. The polynucleotide of claim 1 comprising the nucleotide sequence of SEQ ID NO:1 from nucleotide 1324 to nucleotide 1404.

6. The polynucleotide of claim 1 comprising the nucleotide sequence of SEQ ID NO:3 from nucleotide 178 to nucleotide 1125.

7. The polynucleotide of claim 1 comprising the nucleotide sequence of SEQ ID NO:3 from nucleotide 1189 to nucleotide 1242.

8. A host cell transformed with the polynucleotide of claim 3.

9. The host cell of claim 8, wherein said cell is a mammalian cell.

10. A process for producing a IL-13bc protein, said process comprising:

(a) growing a culture of the host cell of claim 8 in a suitable culture medium; and

(b) purifying the IL-13bc protein from the culture.

11. An isolated IL-13bc protein comprising an amino acid sequence selected from the group consisting of:

(a) the amino acid sequence of SEQ ID NO:2;

(b) the amino acid sequence of SEQ ID NO:2 from amino acids 22 to 334;

- (c) the amino acid sequence of SEQ ID NO:2 from amino acids 357 to 383;
- (d) the amino acid sequence of SEQ ID NO:4;
- (e) the amino acid sequence of SEQ ID NO:4 from amino acids 26 to 341;
- (f) the amino acid sequence of SEQ ID NO:4 from amino acids 363 to 380; and
- (g) fragments of (a)-(f) having a biological activity of the IL-13 receptor binding chain.

12. The protein of claim 11 comprising the amino acid sequence of SEQ ID NO:2.

13. The protein of claim 11 comprising the sequence from amino acid 22 to 334 of SEQ ID NO:2.

14. The protein of claim 11 comprising the amino acid sequence of SEQ ID NO:4.

15. The protein of claim 11 comprising the sequence from amino acid 26 to 341 of SEQ ID NO:4.

16. A pharmaceutical composition comprising a protein of claim 11 and a pharmaceutically acceptable carrier.

17. A protein produced according to the process of claim 10.
18. A composition comprising an antibody which specifically reacts with a protein of claim 11.
19. A method of identifying an inhibitor of IL-13 binding to the IL-13 receptor which comprises:
  - (a) combining a protein of claim 11 with IL-13 or a fragment thereof, said combination forming a first binding mixture;
  - (b) measuring the amount of binding between the protein and the IL-13 or fragment in the first binding mixture;
  - (c) combining a compound with the protein and the IL-13 or fragment to form a second binding mixture;
  - (d) measuring the amount of binding in the second binding mixture; and
  - (e) comparing the amount of binding in the first binding mixture with the amount of binding in the second binding mixture;wherein the compound is capable of inhibiting IL-13 binding to the IL-13 receptor when a decrease in the amount of binding of the second binding mixture occurs.
20. An inhibitor identified by the method of claim 19.
21. A pharmaceutical composition comprising the inhibitor of claim 20 and a pharmaceutically acceptable carrier.

22. A method of inhibiting binding of IL-13 to the IL-13 receptor in a mammalian subject, said method comprising administering a therapeutically effective amount of a composition of claim 21.

23. A method of inhibiting binding of IL-13 to the IL-13 receptor in a mammalian subject, said method comprising administering a therapeutically effective amount of a composition of claim 16.

24. A method of inhibiting binding of IL-13 to the IL-13 receptor in a mammalian subject, said method comprising administering a therapeutically effective amount of a composition of claim 18.

25. An isolated polynucleotide comprising a nucleotide sequence encoding a peptide or protein comprising an amino acid sequence selected from the group consisting of:

- (a) the amino acid sequence of SEQ ID NO:2;
- (b) the amino acid sequence of SEQ ID NO:2 from amino acids 22 to 334;
- (c) the amino acid sequence of SEQ ID NO:2 from amino acids 357 to 383;
- (d) the amino acid sequence of SEQ ID NO:4;
- (e) the amino acid sequence of SEQ ID NO:4 from amino acids 26 to 341;

(f) the amino acid sequence of SEQ ID NO:4 from amino acids 363 to 380; and

(g) fragments of (a)-(f) having a biological activity of the IL-13 receptor binding chain.

26. The protein of claim 11 wherein said amino acid sequence is part of a fusion protein.

27. The protein of claim 26 comprising an Fc fragment.

28. A method of treating an IL-13-related condition in a mammalian subject, said method comprising administering a therapeutically effective amount of a composition of claim 16.

29. The method of claim 28 wherein said condition is an IgE-mediated condition.

30. The method of claim 29 wherein said condition is selected from the group consisting of atopy, an allergic condition, asthma and an immune complex disease.

31. The method of claim 30 wherein said condition is selected from the group consisting of lupus, nephritis, thyroiditis and Grave's disease.

32. A method for potentiating IL-13 activity, said method comprising combining a protein having IL-13 activity with a protein of claim 11 and contacting such combination with a cell expressing at least one chain of IL-13R other than IL-13bc.

33. The method of claim 32 wherein the contacting step is performed by administering a therapeutically effective amount of such combination to a mammalian subject.

34. The protein of claim 11 comprising the amino acid sequence of SEQ ID NO:2 from amino acids 1 to 331.

35. The protein of claim 11 comprising the amino acid sequence of SEQ ID NO:2 from amino acids 26 to 331.

36. The polynucleotide of claim 25 encoding a peptide or protein comprising the amino acid sequence of SEQ ID NO:2 from amino acids 1 to 331

37. The polynucleotide of claim 25 encoding a peptide or protein comprising the amino acid sequence of SEQ ID NO:2 from amino acids 26 to 331.

38. The method of claim 28 wherein said condition is an inflammatory condition of the lung.

39. A method of treating an IL-13-related condition in a mammalian subject, said method comprising administering a therapeutically effective amount of a composition comprising an IL-13 antagonist and a pharmaceutically acceptable carrier.

40. The method of claim 39 wherein said condition is an IgE-mediated condition.

41. The method of claim 40 wherein said condition is selected from the group consisting of atopy, an allergic condition, asthma and an immune complex disease.

42. The method of claim 41 wherein said condition is selected from the group consisting of lupus, nephritis, thyroiditis and Grave's disease.

43. The method of claim 39 wherein said antagonist is selected from the group consisting of an IL-13bc protein, a soluble form of IL-13R $\alpha$ 1, an antibody to IL-13 or an IL-13-binding fragment thereof, an antibody to IL-13bc or an IL-13bc-binding fragment thereof, an antibody to IL-13R $\alpha$ 1 or an IL-13R $\alpha$ 1-binding fragment thereof, IL-13R-binding mutants of IL-4, a small molecule capable of inhibiting the interaction of IL-13 with IL-13bc and a small molecule capable of inhibiting the interaction of IL-13 with IL-13R $\alpha$ 1.



44. The method of claim 43 wherein said IL-13bc protein is a protein of claim 11.

45. A method of inhibiting the interaction of IL-13 with an IL-13bc protein in a mammalian subject, said method comprising administering a therapeutically effective amount of a composition comprising an IL-13 antagonist and a pharmaceutically acceptable carrier.

46. The method of claim 45 wherein said antagonist is selected from the group consisting of an IL-13bc protein, a soluble form of IL-13R $\alpha$ 1, an antibody to IL-13 or an IL-13-binding fragment thereof, an antibody to IL-13bc or an IL-13bc-binding fragment thereof, an antibody to IL-13R $\alpha$ 1 or an IL-13R $\alpha$ 1-binding fragment thereof, IL-13R-binding mutants of IL-4, a small molecule capable of inhibiting the interaction of IL-13 with IL-13bc and a small molecule capable of inhibiting the interaction of IL-13 with IL-13R $\alpha$ 1.

47. The method of claim 46 wherein said IL-13bc protein is a protein of claim 11.